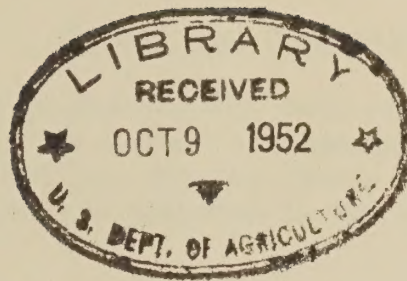


3 POWER REQUIREMENT STUDY,
DOUGLAS COUNTY PUBLIC UTILITY DISTRICT
(WASHINGTON 47 DOUGLAS)
(Revised)



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U.S. 50
Prepared by
Program Analyst
Office of the Administrator
RURAL ELECTRIFICATION ADMINISTRATION.
June 1952

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
CHICAGO, ILL. 60637



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POWER REQUIREMENT STUDY 1/

WASHINGTON 47 DOUGLAS

(Revised)

Foreword

This study has been prepared by the Rural Electrification Administration for use in determining the present and estimated future power requirements of the Douglas County Public Utility District (Washington 47 Douglas).

The estimates of future loads contained in the study have been arrived at from a field survey in the Cooperative's area and from basic data obtained in the Cooperative's office. The estimates of kwh consumption for farm, nonfarm and town residential consumers used herein are based upon a projection of historical trends in consumption, type of farm, income, competitive sources of energy, and other economic factors which are believed to have a bearing on the future use of electricity in this area.

The estimates of average unit kilowatt demands per consumer at peak load, corresponding to the estimated average kilowatt-hour consumption per member per month of farm, nonfarm and small commercial consumers, have been derived from the curve "Maximum Demand at Substation" accompanying Engineering Memorandum No. 94R5 of the Engineering Division, REA, dated August 21, 1950. The total number of consumers to be served in each substation area, rather than the number of consumers in a particular class, was used as a basis in arriving at the total and unit demands in order to reflect the probable overall diversity between classes of consumers in a given substation area. No adjustment for a power factor less than unity was applied, it being assumed for estimating purposes that the KVA demand as read from the curve was equal to the KW demand at the substation.

Summary and Conclusions

Pertinent information reflecting the data and conclusions arrived at regarding the present and future number of consumers, kilowatt-hour requirements, and kilowatt demands for the Douglas County Public Utility District (Washington 47 Douglas) are included in the attached Tables I to VII, inclusive.

Table VII (Summary of Power Requirements) indicates that approximately 4,917 consumers will be served by the Cooperative in 1954, 4,979 in 1957, and 5,188 in 1962, at an estimated maximum demand at substation of 27,317 kilowatts in 1954, 22,827 kilowatts in 1957, and 16,900 kilowatts in 1962. Likewise, it is estimated that the Cooperative's annual energy requirements at substations will approximate 151.6 million kilowatt-hours in 1954, 120.5 million kilowatt-hours in 1957, and 72.4 million kilowatt-hours in 1962.

1/ Based on a field survey conducted by Frank W. Squier, Field Representative, Applications and Loans Division, REA, USDA.

The degree of attainment of area coverage by the Cooperative, as well as the achievement of the estimated kilowatt-hour consumption foreseen in this report, are contingent on the following important considerations:

1. An adequate, dependable source of low-cost power supply.
2. Dependable, adequate electrical power to the ultimate consumer with a minimum of interruption in service and at the lowest retail rate commensurate with "pay out" considerations.
3. A fully prosecuted power use program designed to attain the goals of saturation of appliances and farm equipment reflected by the estimates included in this report.

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E. C. Weitzell,
Program Analyst

TABLE 1

COMPARATIVE ANNUAL OPERATING DATA ON CONSUMERS AND AVERAGE MONTHLY CONSUMPTION

WASHINGTON 47 DOUGLAS (REV.)

(CONT'D.)

YEAR	FARM			NONFARM RESIDENTIAL			SMALL COMMERCIAL			STREET & HWY. LTG.			IRRIGATION & SPRAY		
	MEMBERS NO.	AVERAGE KWH/MO. % INCR.		MEMBERS NO.	AVERAGE KWH/MO. % INCR.		MEMBERS NO.	AVERAGE KWH/MO. % INCR.		MEMBERS NO.	AVERAGE KWH/MO. % INCR.		MEMBERS NO.	AVERAGE KWH/MO. % INCR.	
1945 1/	59	3,572	--	202	260	--	22	820	--	3	424	--			
1946	102	284	--	189	235	--	64	521	--	2	696	--	54	5,674 --	
1947	116	346	21.8	237	279	18.7	100	505	-3.1	2	795	14.2	50	4,907 -13.5	
1948	426	366	5.8	271	375	34.4	138	464	-8.1	2	767	-3.5	37	3,092 -37.0	
1949	429	500	36.6	318	438	16.8	164	538	15.9	2	1,082	41.1	37	4,733 53.1	
1950	516	576	15.2	2,031	376	-14.2	446	764	42.0	4	1,924	77.8	272	3,441 -27.3	
1951	757	525	-8.8	2,383	411	9.3	520	927	21.3	5	3,189	65.7	222	4,270 24.1	
1952 2/	447	873	--	2,579	587	--	659	894	--	6	3,788	--	17	107 --	
SUM OF YEARLY % INCR. (1946 - 1951)													195.3	-0.6	
AVERAGE PER YEAR													39.1	-0.1	

1/ EIGHT MONTHS ONLY.

2/ THREE MONTHS ONLY.

(CONT'D. ON NEXT PAGE)

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE I (CONT'D.)

COMPARATIVE ANNUAL OPERATING DATA ON CONSUMERS AND AVERAGE MONTHLY CONSUMPTION

WASHINGTON 47 DOUGLAS (REV.)														
YEAR	OTHER UTILITIES			LARGE POWER			OWN SERVICE			OTHER			TOTAL	
	MEMBERS NO.	AVERAGE KWH/MO. % INCR.		MEMBERS NO.	AVERAGE KWH/MO. % INCR.		MEMBERS NO.	AV. KWH/MO.		MEMBERS NO.	AV. KWH/MO.		MEMBERS NO.	AVERAGE KWH/MO. % INCR.
1945 1/							5	14,851		288	1,083	--		
1946										390	740	--		
1947										493	698	-5.7		
1948										874	501	-28.2		
1949							2	1,474		951	653	30.3		
1950	1	225,231	--	12	23,516	--				3,280	855	30.9		
1951	1	242,427	7.6	3	34,393	46.3				3,890	1,053	23.2		
1952 2/	1	288,267	--	3	1,739,742	--				3,712	2,162	--		
SUM OF YEARLY % INCR.														
(1946 - 1951)														
AVERAGE PER YEAR														
50.5														
10.1														

1/ EIGHT MONTHS ONLY.

2/ THREE MONTHS ONLY.

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE II

COMPARATIVE ANNUAL OPERATING DATA ON ENERGY REQUIREMENTS

WASHINGTON 47 DOUGLAS (REV.)												
YEAR	ENERGY PURCHASED		ENERGY SOLD		ENERGY LOSSES		MAXIMUM KW DEMAND	AVERAGE COST PER KWH	TOTAL MILES ENERGIZED	TOTAL SERVICES CONNECTED	OVERALL CONSUMER DENSITY	
	KWH	% INCR.	KWH	% INCR.	KWH	% LOSS						
1945 1/	2,401,400	---	2,076,818	---	324,582	13.5	*	\$.00651	60	317	5.28	
1946	4,995,931	---	3,457,233	---	1,538,698	30.8	1,170	.00413	67	490	7.31	
1947	4,969,879	-0.5	4,124,525	19.3	845,354	17.0	1,786	.00336	486	595	1.22	
1948	6,124,370	23.2	5,252,433	27.3	871,937	14.2	1,764	.00324	486	886	1.82	
1949	8,370,500	36.7	7,450,585	41.9	919,915	11.0	2,082	.00321	496	981	1.98	
1950	39,730,113	374.6	33,632,192	351.4	6,097,921	15.3	4,386	.00308	690	3,523	5.11	
1951	55,202,206	38.9	49,135,449	46.1	6,066,757	11.0	11,974.4	.00309	821	4,223	5.14	
1952 2/	25,470,720	---	24,076,036	---	1,394,684	---	11,724.9	.00283	821	4,260	5.19	
SUM OF YEARLY % INCR.												
(1946 - 1951)		472.9										
AVERAGE PER YEAR		94.6										

TABLE III

ESTIMATE OF LOADS - CHIEF JOSEPH SUBSTATION AREA

WASHINGTON 47 DOUGLAS (REV.)	NUMBER OF CONSUMERS				KW DEMAND			ANNUAL KWH REQUIREMENTS		
	1954	1957	1962		1954	1957	1962	1954	1957	1962
TYPE OF CONSUMER										
FARM	275	285	295		@2.310	@2.535	@2.927	@8700	@9600	@11,100
					635	722	863	2,392,500	2,736,000	3,274,500
NONFARM (RES.)	1,200	1,200	1,300		@1.542	@1.655	@1.849	@5700	@6120	@6900
					1,850	1,986	2,404	6,840,000	7,344,000	8,970,000
SMALL COMMERCIAL	300	300	275		@1.772	@1.849	@1.923	@6600	@6900	@7200
					532	555	529	1,980,000	2,070,000	1,980,000
LARGE COMMERCIAL	17	17	16		@18/2.0DF	@18/2.0DF	@18/2.0DF	@37,000	@37,000	@33,000
					153	153	144	629,000	629,000	528,000
PUBLIC BUILDINGS *	33	33	33		@9/1.33DF	@9/1.33DF	@9/1.33DF	@25,700	@26,300	@26,300
					223	223	223	848,100	867,900	867,900
LARGE POWER:					@56/2.0DF	@56/2.0DF	@56/2.0DF			
DYE HAWLEY MOTEL	1	1	1		@30/1.1DF	@30/1.1DF	@30/1.1DF	119,900	125,000	125,000
					28	28	28			
STEAK HOUSE	1	1	1		@5500/1.1DF			236,400	240,000	240,000
					27					
CHIEF JOSEPH BUILDERS	1				5,000			26,000,000		
POWER HOUSE CONSTRUCTION	1	1			@2000/1.1DF	@2000/1.5DF		12,000,000	6,000,000	
					1,818	1,333				
SMALL INDUSTRIES (POTENTIAL)			2				@600/1.2DF			5,000,000
							1,000			
STREET LIGHTING	3	3	3		@25/1.25DF	@25/1.25DF	@25/1.25DF	@41,466	@41,466	@41,466
					60	60	60	124,400	124,400	124,400
SPRAY (INSECTICIDE)	4	4	4		@34/3.0DF	@34/3.0DF	@34/3.0DF	@1660	@1660	@1660
					45	45	45	6,640	6,640	6,640
SUB-TOTAL	1,836	1,845	1,930		10,371	5,132	5,323	51,176,940	20,142,940	21,116,440

* CONSUMERS INCLUDED IN THIS CLASS ARE IN ACCORDANCE WITH STATE OF WASHINGTON REQUIREMENTS.

NOTE: DEMAND IS BASED ON ACTUAL DEMAND.

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

[CONT'D. ON NEXT PAGE]

TABLE III (CONT'D.)

ESTIMATE OF LOADS - CHIEF JOSEPH SUBSTATION AREA

WASHINGTON 47 DOUGLAS (REV.)	TYPE OF CONSUMER	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
		1954	1957	1962	1954	1957	1962	1954	1957	1962
	BROUGHT FORWARD	1,836	1,845	1,930	10,371	5,132	5,323	51,176,940	20,142,940	21,116,440
	LARGE POWER (CONT'D.):									
	IRRIGATION	94	123	126	12.5/1.33DF 954	11/1.33DF 1,017	11/1.33DF 1,042	22,000 2,068,000	18,000 2,214,000	18,000 2,268,000
	PUD OFFICE	1	1	1	41/1.5DF 27	41/1.5DF 27	41/1.5DF 27	75,000	75,000	75,000
	SUB-TOTAL							53,319,940	22,431,940	23,459,440
	PLUS DIST. LOSSES (APPROX.)							10% 5,924,060	12% 3,059,060	13% 3,505,560
	TOTAL	1,931	1,969	2,057	11,252	6,176	6,392	59,244,000	25,491,000	26,965,000
ANNUAL LOAD FACTOR -								59.6%	47.1%	48.2%

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE IV

ESTIMATE OF LOADS - CHELAN SUBSTATION AREA

WASHINGTON 47 DOUGLAS (REV.)	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
	1954	1957	1962	1954	1957	1962	1954	1957	1962
TYPE OF CONSUMER									
FARM	180	190	200	@2.310	@2.535	@2.927	@8700	@9600	@11,100
				416	482	585	1,566,000	1,824,000	2,220,000
NONFARM (RES.)	2,130	2,230	2,320	@1.542	@1.655	@1.849	@5700	@6120	@6900
				3,284	3,691	4,290	12,141,000	13,647,600	16,008,000
SMALL COMMERCIAL	168	188	210	@2.662	@2.662	@2.662	@10,080	@10,080	@10,080
				447	500	559	1,693,440	1,895,040	2,116,800
LARGE COMMERCIAL	3	3	3	@16/3.0DF	@16/3.0DF	@16/3.0DF	105,650	107,500	107,500
				16	16	16			
PUBLIC BUILDINGS **	37	37	37	@9/1.25DF	@9/1.25DF	@9/1.25DF	@21,800	@23,722	@24,262
				266	266	266	806,700	877,700	897,700
PUD OFFICE BUILDINGS	1	1	1	@20/3.0DF	@20/3.0DF	@20/3.0DF	50,000	50,000	50,000
				7	7	7			
MUNICIPAL	1	1	1	@1000/1.25DF	@1200/1.25DF	@1500/1.25DF	3,347,000	3,639,000	4,369,000
(CITY OF WATERVILLE)				800	960	1,200	28,743	28,743	28,743
STREET & HWY, LIGHTING	4	4	4	@10/1.1DF	@10/1.1DF	@10/1.1DF	114,972	114,972	114,972
				36	36	36			
SPRAY	106	--	--	@10/3.5DF	--	--	51,500	--	--
				(302)*					
IRRIGATION	355	355	355	@15/1.5DF	@15/1.5DF	@15/1.5DF	@36,000	@36,000	@36,000
				3,550	3,550	3,550	12,780,000	12,780,000	12,780,000
SUB-TOTAL							32,656,262	34,935,812	38,663,972
							@15%	@15%	@15%
PLUS DIST. LOSSES (APPROX.)							5,762,738	6,165,188	6,823,028
TOTAL	2,985	3,009	3,131	8,827	9,508	10,509	38,419,000	41,101,000	45,487,000

* NOT INCLUDED IN TOTAL.

ANNUAL LOAD FACTOR - 49.7%

49.3%

49.4%

** CONSUMERS INCLUDED IN THIS CLASS ARE IN ACCORDANCE WITH STATE OF WASHINGTON REQUIREMENTS.

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE V

ESTIMATE OF LOADS - SUMMARY OF POWER REQUIREMENTS
(BY CLASSIFICATION OF CONSUMERS)

WASHINGTON 47 DOUGLAS (REV.)	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
	1954	1957	1962	1954	1957	1962	1954	1957	1962
FARM	455	475	495	1,051	1,204	1,448	3,958,500	4,560,000	5,494,500
NONFARM (RES.)	3,330	3,430	3,620	5,134	5,677	6,694	18,981,000	20,991,600	24,978,000
SMALL COMMERCIAL	468	488	485	979	1,055	1,088	3,673,440	3,965,040	4,096,800
LARGE COMMERCIAL	20	20	19	169	169	160	734,650	736,500	635,500
PUBLIC BUILDINGS	70	70	70	489	489	489	1,654,800	1,745,600	1,765,600
PUD OFFICE	2	2	2	34	34	34	125,000	125,000	125,000
LARGE POWER:									
DYE HAWLEY MOTEL	1	1	1	28	28	28	119,900	125,000	125,000
STEAK HOUSE	1	1	1	27	27	27	236,400	240,000	240,000
CHIEF JOSEPH BUILDERS	1	0	0	5,000	--	--	26,000,000	--	--
POWER HOUSE CONSTRUCTION	1	1	0	1,818	1,333	--	12,000,000	6,000,000	--
SMALL INDUSTRIAL (POT.)	0	0	2	--	--	1,000	--	--	5,000,000
SUB-TOTAL	4,349	4,488	4,695	14,729	10,016	10,968	67,483,690	38,488,740	42,460,400

(CONT'D. ON NEXT PAGE)

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE V (CONT'D.)

ESTIMATE OF LOADS - SUMMARY OF POWER REQUIREMENTS
(BY CLASSIFICATION OF CONSUMERS)

WASHINGTON 47 DOUGLAS (REV.)									
TYPE OF CONSUMER	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
	1954	1957	1962	1954	1957	1962	1954	1957	1962
BROUGHT FORWARD LARGE POWER (CONT'D.):	4,349	4,488	4,695	14,729	10,016	10,968	67,483,690	38,488,740	42,460,400
STREET LIGHTING	7	7	7	96	96	96	239,372	239,372	239,372
SPRAY (INSECTICIDE)	110	4	4	45	45	45	58,140	6,640	6,640
IRRIGATION MUNICIPAL	449	478	481	4,504	4,567	4,592	14,848,000	14,994,000	15,048,000
(CITY OF WATERTOWN)	1	1	1	800	960	1,200	3,347,000	3,639,000	4,369,000
SUB-TOTAL							85,976,202	57,367,752	62,123,412
PLUS DIST. LOSSES (APPROX.)							11,686,798	9,224,248	10,328,588
TOTAL	4,916	4,978	5,188	20,174	15,684	16,901	97,663,000	66,592,000	72,452,000
ANNUAL LOAD FACTOR -							55.3%	48.5%	48.9%

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE VI

ESTIMATE OF LOADS - ROCK ISLAND SUBSTATION AREA

WASHINGTON 47 DOUGLAS (REV.)

TYPE OF CONSUMER	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
	1954	1957	1962	1954	1957	1962	1954	1957	1962
LARGE POWER:									
KEOKUCK ELECTRIC METAL CO.	1	1	--	67500/1.05DF 7,143	67500/1.05DF 7,143	--	54,000,000	54,000,000	--
TOTAL	1	1	--	7,143	7,143	--	54,000,000	54,000,000	--

ANNUAL LOAD FACTOR -

86.3%

86.3%

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

TABLE VII

ESTIMATE OF LOADS - SUMMARY OF POWER REQUIREMENTS

WASHINGTON 47 DOUGLAS (REV.)

SUBSTATION AREA	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
	1954	1957	1962	1954	1957	1962	1954	1957	1962
CHIEF JOSEPH	1,931	1,969	2,057	11,352	6,176	6,392	59,244,000	25,491,000	26,965,000
CHELAN	2,985	3,009	3,131	8,822	9,508	10,509	38,419,000	41,101,000	45,487,000
ROCK ISLAND	1	1	--	7,143	7,143	--	54,000,000	54,000,000	--
TOTAL	4,917	4,979	5,188	27,317	22,827	16,900	151,663,000	120,592,000	72,452,000

ANNUAL LOAD FACTOR - 63.4% 60.3% 48.9%

PROGRAM ANALYST, OFFICE OF THE
ADMINISTRATOR, REA - JUNE 1952

